MINUTES

MINE SAFETY AND HEALTH RESEARCH ADVISORY COMMITTEE (MSHRAC) MEETING

JULY 24-25, 2013

NATIONAL INSTITUTE FOR OCCUPATIONAL SAFETY AND HEALTH

626 COCHRANS MILL RD., BLDG. 140 ROOM 101

PITTSBURGH, PA 15236

COMMITTEE MEMBERS & ATTENDEES PRESENT

Dr. Jeffery L. Kohler, Executive Secretary to MSHRAC, Associate Director for Mining and

Director, Office of Mine Safety and Health Research (OMSHR), National Institute for Occupational Safety and Health (NIOSH), called the meeting to order. The following members were present:

Mr. Brent Chamberlain, Consultant, Scorpio Gold Corp.

Mr. Dennis O'Dell, Administrator for Occupational Health and Safety, United Mine Workers of America

Dr. Jeffery Kravitz, Chief, Scientific Development, Mine Emergency Operations, Mine Safety and Health Administration

Mr. Emmett Russell, Director, Department of Safety and Health (Retired), International Union of Operating Engineers

Mr. Michael Wright, Director of Health, Safety, and Environment, United Steelworkers of America

Dr. Cecile Rose, Associate Professor, Department of Medicine, University of Colorado

Dr. Samuel Frimpong, Professor and Chair, Mining and Nuclear Engineering, Missouri Science and Technology

Mr. Anthony S. Bumbico, Vice-President of Safety (Retired), Arch Coal Co.

Mr. Kelly F. Bailey, Director, Safety, Health and Environmental Services, Vulcan Materials Co.

Dr. Richard J. Fragaszy, Program Director, Division of Civil, Mechanical and Manufacturing Innovation, National Science Foundation

Dr. Derek Elsworth, Professor, Department of Energy and Mineral Engineering, Pennsylvania State University

The following attendees were also present:

Andrew Cecala, NIOSH, Pittsburgh, PA

Bob Stein, NIOSH, Pittsburgh, PA

L. Casey Chosewood, NIOSH, Atlanta, GA

Cara Halldin, NIOSH, Morgantown, WV

Chad McDougal, Vulcan Materials Co., Birmingham, AL
Dana R. Willmer, NIOSH, Pittsburgh, PA

David Berg, Carmeuse Lime and Stone, Pittsburgh, PA

Drew Potts, NIOSH, Pittsburgh, PA

Ed Green, Crowell & Moring LLC, Washington, DC

Eileen Storey, NIOSH, Morgantown, WV

Eric S. Weiss, NIOSH, Pittsburgh, PA

Gerald Finfinger, Pittsburgh, PA

Gerrit Goodman, NIOSH, Pittsburgh, PA

Jeff Welsh, NIOSH, Pittsburgh, PA

Jeff Whyatt, NIOSH, Spokane, WA

Jim Sharpe, Sharpe Media, LLC, Arlington, VA

Kristin Yeoman, NIOSH, Spokane, WA

Lance Olson, Carmeuse Lime and Stone, Pittsburgh, PA

Linda McWilliams, NIOSH, Pittsburgh, PA

Marie Chovanec, NIOSH, Pittsburgh, PA

Mark Ellis, IMA-NA, Washington, D.C.

Maryann D'Alessandro, NIOSH, Pittsburgh, PA

Michael J. Sapko, Pittsburgh, PA

Mike Parris, Walter Energy, Birmingham, AL

Pat Brady, Murray Energy Corp., St. Clairsville, OH

R.J. Matetic, NIOSH, Pittsburgh, PA

Richard Wood, IUOE, Beaver, WV

Rohan Fernando, NIOSH, Pittsburgh, PA

Scott Laney, NIOSH, Morgantown, WV

Susan M. Moore, NIOSH, Pittsburgh, PA

Tom Dubaniewicz, NIOSH, Pittsburgh, PA

William Marras, Ohio State University, Columbus, OH

Dr. Kohler explained that MSHRAC members participating in the meeting must be free from conflicts of interest. He asked members to declare conflicts of interest each day prior to the start of the meeting. There were no conflicts from members reported.

Dr. Rose read the Minutes from the last meeting and they were approved unanimously with corrections.

DR. JOHN HOWARD, REPORT FROM THE DIRECTOR, NIOSH

Dr. Howard welcomed everyone to the meeting and wanted MSHRAC to know that the Institute holds the Mining Program in the highest regard. He is still very disappointed about the loss of the underground testing facility and the difficulties it has caused with a portion of the mining research program. CDC is committed to finding and purchasing a replacement for the lab and a search for the replacement has been initiated.

Dr. Howard stated that OMSHR transitioned from a geographic-centric to a program-centric organizational model approximately three years ago. The Institute would like to evaluate the efficacy of this change, and is seeking ideas from MSHRAC about how such an evaluation might be conducted and what metrics might be used in the evaluation.

DR. JEFFERY L. KOHLER, REPORT FROM THE ASSOCIATE DIRECTOR FOR MINING SAFETY AND HEALTH, NIOSH

Dr. Kohler welcomed the members and provided an overview of both the meeting agenda and the goals for the Committee. After an overview presentation on the overall state of the Office of Mine Safety and Health Research, that included staffing, budget, extramural research, and the challenges faced by program there was detailed discussion on each of the topics.

The Committee was asked to provide feedback on the OMSHR responses to the three topics that MSHRAC asked OMSHR to examine during the previous MSHRAC meeting: Improved use of trade literature, Ideas for conducting the National Demographics Survey on a more frequent basis, and Identification of SSG Safety Needs that could be addressed through research. The Committee was asked for feedback on the relevance and impact of: Reducing dust exposures in SSG operations (HelmetCam), Criteria for a new rock dust definition, and Lithium Batteries – an emerging issue. The Committee was asked to assess the approach and progress of the research projects: Reinventing deep vein mining to improve health and safety, Oxygen supply, and 1 mg Initiative to develop and deploy new coal mine dust control technologies. The Committee was asked to the develop procedures and metrics for conducting an evaluation of the organizational model now that OMSHR is program-centric instead of geographic-centric.

DR. SUSAN MOORE, OFFICE OF MINE SAFETY AND HEALTH RESEARCH, NIOSH

Dr. Susan Moore discussed OMSHR's plan to improve its direct engagement with the mine worker and operators through a more strategic use of trade magazines. The process OMSHR uses to identify diffusion priorities and opportunities was presented and the types of dissemination mechanisms (e.g., peer-reviewed publication, social media, web page, trade magazines) used for this diffusion were discussed. Dr. Moore then described recent efforts to develop a database of key trade publications in the three mining sectors. The database included relevant information such as sector served, circulation, format (e.g., print, online), frequency, and readership (e.g., operators, manufacturers, consultant). A list of the trade magazines and a description of their readership was circulated to the Committee for review and comment. Dr. Moore then presented OMSHR's view that trade magazines should be used to communicate implementable solutions—i.e., if read by this trade magazine's readership, they would likely adopt a new work practice, behavior, or technology. Several examples of trade magazine articles OMSHR intends to publish were then provided. Discussions after the presentation centered around expanding the database to include appropriate State associations, providing continuing education credits for reviewing OMSHR trade literature in coordination with MSHA, and expanding OMSHR's use of social media to communicate with the mine worker.

MS. LINDA MCWILLIAMS, OFFICE OF MINE SAFETY AND HEALTH RESEARCH, NIOSH

At the MSHRAC Meeting in 2012, Ms. McWilliams presented an overview of the National Survey of the Mining Population, a probability-based sample survey, conducted by NIOSH, of U.S. mining operations and their employees. It was the consensus of MSHRAC that NIOSH should continue to conduct surveys of this type. At this year's MSHRAC meeting the successes and lessons learned from the first national survey were reviewed. Then Ms. McWilliams presented the objectives for this meeting which consisted of providing the current project plans for the proposed Mining Industry Surveillance System regarding: stakeholder input; developing the survey materials; the survey implementation strategy; and the project schedule.

For the Mining Industry Surveillance System, surveys will be conducted on a rotating basis in the mining sectors aligned with mining associations – Coal, Metal/Nonmetal, and Stone/Sand and Gravel. Stakeholders will be asked to provide input on the priority order for surveying the mining industry sectors, the content of the questionnaire, strategies for administering the survey, and possible response incentives. The development of the survey materials was discussed. Ms. McWilliams then presented an overview of the survey implementation strategy and the proposed project schedule. She noted that the process of obtaining the Paperwork Reduction Act clearance could take 12 to 18 months. For this reason, the survey in the first mining sector would probably not be conducted until 2015 with the report of the results being ready by 2016.

DR. R.J. MATETIC, OFFICE OF MINE SAFETY AND HEALTH RESEARCH, NIOSH

Dr. Matetic presented information on injuries and fatalities in the Stone, Sand, and Gravel (SSG) mining sector. The purpose was to discuss the nature of fatalities and injuries occurring in the SSG sector, and potential opportunities for further improvements in worker safety. NIOSH-OMSHR has a strong intramural program that is addressing occupational health issues (exposure to diesel particulate matter, noise, and silica dust) in this mining industry sector, but there may be gaps in research to address SSG safety issues.

An analysis was conducted of the Mine Safety and Health Administration's Accident/Injury/Illness data files for the stone, sand and gravel sector to better understand injuries and fatalities that have occurred. For the study period, 2007 – 2011, there were 61 fatal injuries and 10,272 non-fatal, lost-time injuries. For the fatal injuries, the top Accident/Injury/Illness classification was "Powered haulage" (26.2%) and top worker activity at the time of fatality was "Machine maintenance and repair" (32.8%). For non-fatal, lost-time injuries, the top Accident/Injury/Illness classification was "Handling Material" (35.7%) and the top mine worker activities at the time of injury were "Handling supplies or material, load and unload" (18.6%), and "Machine maintenance and repair" (18.3%).

A plan in moving forward to address the root cause of injuries and fatalities in stone, sand and gravel was discussed. It includes empowering miners through management-worker collaboration to improve safety with knowledge and skills to recognize and respond to hazards through improved hazard identification and mitigation approaches. Technology is also seen as playing a role in the process.

DR. JEFFREY WHYATT, OFFICE OF MINE SAFETY AND HEALTH RESEARCH, NIOSH

Dr. Whyatt presented an overview of a new project "Ground Control Safety in Deep Vein Mines." Such mines typically encounter mining induced seismicity associated with slip of faults as they pursue rich but thin veins of ore deep into the earth. This mining induced seismicity is a significant hazard, accounting for many of the most severe accidents in these mines. Development of better methods for assessing and controlling the potential severity of these seismic events is a major objective of this project. It goes hand-in-hand with a second task aimed at developing and rating energy absorbing support designs that will resist these events. The third task arises from the confines of deep veins, and the deep shafts driven to access them, which have impeded mechanization and left operations dependent on the use of hand-held "jackleg" drills. As a result of these factors, a large portion of ground control accidents (85% for a collaborating mining during a recent period) are often associated with installation and rehabilitation of support systems. These, in combination with machine injuries associated with use of jackleg drills, can represent a significant proportion of mine injuries (25% in a collaborating mine during a recent period). Thus, this third task is aimed at optimizing ground and machine safety through the "life cycle" of ground support – from installation through operation and any needed rehabilitation. The project is being pursued in close collaboration with a deep vein mine.

DR. WILLIAM MARRAS, INTEGRATED SYSTEMS ENGINEERING DEPARTMENT, OHIO STATE UNIVERSITY

Dr. Marras presented an overview of the report prepared for OMSHR under the guidance of the National Research Council on the topic of "Improving Self-Escape from Underground Coal Mines." Dr. Marras, Chair of the Committee, acknowledged the Committee membership, described the processed used for collecting data and emphasized the goals and objectives of the study. The primary task of the Committee was focused on identifying what is required to give mine workers self-escape capabilities during an emergency. The Committee's recommendations included the need for the mining community to consider the human-systems integration approach and to ensure the four primary areas of training, technology, equipment and emergency response plans are adequately considered. These considerations include robust data collection, carefully constructed emergency response plans, the development of feedback mechanisms for input from miners and coal operators and active engagement with technology suppliers. In order to achieve the goal for improving self-escape from underground coal mines, the Committee provided seven recommendations:

Systematic efforts by operators and federal agencies to collect and analyze regularly information from drills and escape situations and make outcomes and lessons learned available to stakeholders for future improvements

Both NIOSH and MSHA should review their operational requirements for emergency supplies of breathable air. NIOSH should allocate funds for research and development to improve the functionality of breathable air devices

NIOSH and MSHA should accelerate efforts to develop other technologies that enhance miners' ability to escape

NIOSH and MSHA should re-examine their technology approval and certification process to ensure these are not deterring innovation in relation to self-escape technologies

Use current research to develop self-escape materials, training, and protocols for effective decision-making during a mine emergency

NIOSH should expand their safety culture efforts to continue to inform the mining industry including compiling and disseminating to the industry existing research findings

NIOSH should undertake or sponsor a task analysis of self-escape and identify the KSAs - essential to identifying the training needs for mine workers and MSHA should include in review of facilities supporting mine rescue training evaluation of whether these facilities could support self-escape simulation and scenario training

Dr. Marras presented other real-life scenarios of the human systems integration concept to further explain the findings and recommendations of the Committee. There was general discussion following the presentation including related research tasks that are being conducted by OMSHR.

DR. CASEY CHOSEWOOD, HEALTHIEST NATION COORDINATOR, NIOSH

Dr. L. Casey Chosewood presented an overview of the NIOSH Total Worker Health™ program. He detailed the program's strategy to promote integrating occupational safety and health protection with evidenced-based health promotion interventions to prevent worker injury and illness and to advance the overall health and well-being of workers. This program supports research that highlights increasing evidence that the work environment and the overall health, safety and well-being of the workers within it are strongly connected. Diminished health and injury, whether caused by work or resulting from non-work activities, reduces quality of life, opportunity, and income for workers and those dependent upon them. But in workplaces with low risk of injury and enhanced opportunities for overall health improvement, workers can experience significant health gains and employers can see enhanced productivity. The program promotes the development of workplace policies and programs that improve the culture of health and safety within workplaces. Examples of integrated Total Worker Health™ interventions may include:

Respiratory protection programs that also address tobacco use and provide for smoking cessation

Ergonomics programs that teach joint health and arthritis management

Stress management classes that seek to diminish workplace stressors, personal stressors and build resiliency

Dr. Chosewood reviewed the growing evidence base and the NIOSH rationale for advancing these integrated efforts. He discussed the advantages of using the workplace a venue for health interventions and drew connections to the work and non-work threats to health and productivity. A special examination of demographics, changing nature of work, aging, chronic disease rates among workers, shift work, and low-wage work was highlighted. Strategies for using the built environment and policy environment to more sustainably advance worker health were also presented. A discussion on benefits, challenges, and opportunities related to these interventions followed the presentation.

DR. EILEEN STOREY, DIVISION OF RESPIRATORY DISEASE STUDIES, NIOSH

Eileen Storey, MD, MPH, Surveillance Branch Chief, Division of Respiratory Disease Studies, NIOSH provided an update of the work conducted by the Coal Workers' Health Surveillance Program since 2009. The CWHSP focused the survey activities of the van on surface miners in 2010 and 2011 in 16 states. The survey reached 2,328 miners, 7% of U.S. surface miners. Overall, 2 % had evidence of pneumoconiosis and 0.5% were found to have progressive massive fibrosis. The prevalence was higher in Central Appalachia than in the rest of the country. The survey in 2012 focused on miners from small underground mines. Surveys in 2012 and 2013 were both directed towards underground miners and encouraged participation among former miners as well as active miners.

Since 2009, several publications have summarized findings of the CWHSP between 2005 and 2009. The findings were highlighted. Committee members requested references which are listed below. To facilitate access to information collected through the CWHSP, the Division developed an online data query system. This allows interested parties to obtain data on rates of coal workers' pneumoconiosis over various time periods, by geographic location, etc.

A major area of work at DRDS has been the transition to digital chest imaging for the classification of images for the pneumoconioses. NIOSH has evaluated the equivalency of this method to the traditional analog method and has concluded that digital images can be used for this purpose. NIOSH has developed systems to acquire, transfer, distribute and interpret digital images of the CWHSP. It produced a guideline for B-readers to facilitate the transition to this method. Current work focuses on developing a digital chest image repository for images from around the globe to develop new standards for the International Labor Organization and to provide images for teaching and testing.

For the information discussed during the presentation, refer to the following references:

1. AS Laney, and MD Attfield: Coal workers' pneumoconiosis and progressive massive fibrosis are increasingly more prevalent among workers in small underground coal mines in the United States. Occup Environ Med. 2010. 67(6): p. 428-31.

2. E Suarthana, AS Laney, E Storey, et al: Coal workers' pneumoconiosis in the U.S. 40 years after the launching of the 1969 coal act. Occup Environ Med. 2011. 68(12): 908-913.

3. AS Laney, MD Attfield: Examination of Potential Sources of Bias in the US coal Workers' Health Surveillance Program. AJPH, published online May 16, 2013.

MR. DREW POTTS, OFFICE OF MINE SAFETY AND HEALTH RESEARCH, NIOSH

Mr. Potts gave a presentation on a research imperative to reduce coal dust exposures. He talked about a three prong strategy developed and initiated in 2008 by the Dust, Ventilation and Toxic Substances Branch of OMSHR to enable mines to comply with an MSHA proposed reduction in the coal mine dust standard from 2 to 1 mg/m3. The three prongs of the strategy include increased worker empowerment through the promotion of the Personal Dust Monitor (PDM), a heightened education and technology transfer program as well as the execution of a research and development plan to innovate, evaluate or refine dust control technology to further reduce occupational exposures. Targeted occupations for control technology include the roof bolting machine operator, continuous miner operator, shearer operator, longwall return jacksetter and surface blasthole drill operator. Information was presented concerning the development, testing and certification of the PDM device for improved resistance to radio frequency interference and a model without a cap lamp. The education and technology transfer activities included four publications in 2013: use of a bolting machine bit sleeve to improve dust capture, optimized operator cab design, use of redirected scrubber airflow to control dust rollback from the continuous mining machine, and the effects of scrubber operation on continuous mining dust levels. Mr. Potts also reviewed recently commercialized dust control technologies as well as current dust control research activities. Recently commercialized dust control devices that were supported by OMSHR research include the previously mentioned bit sleeve (Kennametal) and a canopy air curtain (Fletcher) that supplies a fresh split of air into the roof bolter operator's breathing zone. OMSHR's current longwall mining dust control research areas include a shearer-mounted tailgate spray manifold used to maintain a fresh split of air in the walkway, a shearer-mounted scrubber, shield-mounted water sprays to control dust generated by coal spalling and the use of foam to reduce dust generated during the movement of shields. Current continuous mining dust control research

areas include the evaluation of a standalone dust collector used to create a fresh split of air for miners working downwind of coal cutting, increased continuous miner water spray volumes and the identification of practices for improved dust control when cutting crosscut entries.

MR. ANDREW CECALA, OFFICE OF MINE SAFETY AND HEALTH RESEARCH, NIOSH

Mr. Cecala discussed a new respirable dust assessment tool developed in a cooperative effort with Unimin Corporation call "Helmet-CAM." The Helmet-CAM technology is a person-wearable video recorder with a data logging dust monitor that are worn by a miner in a backpack, safety belt, or safety vest to identify areas or job tasks of elevated exposure. After a miner performs his or her job while wearing the unit, the video and dust exposure data are the data files are downloaded to a computer and then merged together through a NIOSH-developed computer software program called EVADE (Enhanced Video Analysis of Dust Exposure). By providing synchronized playback of the merged video footage and dust exposure data, the EVADE software allows for the assessment and identification of key work areas and processes, as well as work tasks that significantly impact a worker's personal respirable dust exposure. The Helmet-CAM technology has been tested at a number of metal/nonmetal mining operations and has proven to be a very valuable assessment tool. Mining companies wishing to use this technique can purchase a commercially-available video camera and an instantaneous dust monitor to obtain the necessary data, and the NIOSH-developed EVADE software will be available in the very near future for download at no cost on our NIOSH website.

MR. ROHAN FERNANDO, OFFICE OF MINE SAFETY AND HEALTH RESEARCH, NIOSH

Mr. Fernando presented the work conducted at DMST – OMSHR on Breathing Air Supplies (BAS) for underground mining that are a range of devices and systems that offer respiratory protection to miners in the event of an emergency.

The R&D effort at this time is continuing with developing different combinations and configurations of BAS such as the next generation SCSRs with Docking and Switch-Over Valves, Hood/Mask and Very High Pressure Cylinders. A Breathing Air Supplies 'Road Map' identifying the different BAS categories was shown. Conducting usability studies to find the optimal solutions for the different combinations and configurations of BAS such as next generation SCSRs with DSOVs and HMCs was highlighted.

Study of the existing SCSRs to identify areas for improvement is almost complete. This would then lead to developing an ergonomic design of a one-hour mine escape apparatus that can be worn comfortably at the working face. Further, research into more efficient breathing gas chemicals is planned. Some improvements to Refill Stations to use large volume cylinders, have on-board breathing in addition to the refill capability were mentioned. A pre-prototype Cryogenic BA has been constructed at NASA for out-by escape. A proof-of-concept demonstration rig for the future generation of Rescue Breathing Apparatus is undergoing tests for optimizing the efficiency of key components at the Naval Surface Warfare Center. Additionally, a carbon dioxide absorber monitor and liquid oxygen delivery and supply system is being developed for this apparatus. For refuge alternatives, a zero loss liquid gas storage and supply station is being developed together with NASA. It is now being integrating into a Refuge Alternative for unmanned testing.

Challenges in implementing this new technology were mentioned. Some of the standards and policy considerations would impact the future generation BA. New NIOSH standards may be required for some BA designs. Consideration for breathing apparatus certification to other standards in addition to NIOSH standards may be required.

Proposed technology demonstrators and prototypes resulting from this development program were described.

DR. MARYANN D'ALESSANDRO, NATIONAL PERSONAL PROTECTIVE TECHNOLOGY LABORATORY, NIOSH

Dr. Maryann D'Alessandro provided an overview of NIOSH National Personal Protective Technology Laboratory (NPPTL) activities that support mining occupational safety and health. Her presentation provided an update of the respirator certification activity where she described the pre-approval and post-approval certification authorities and responsibilities of NIOSH and MSHA. She then provided an overview of the NIOSH NPPTL post market surveillance activity on the self-contained self-rescuer (SCSR) respirators used for escape in the mining environment which is known as the Long Term Field Evaluation Program (LFTE). In 2009, the LTFE Program was revised to include units that meet inspection criteria and a statistically based sample of respirators fielded across the mining environment using the MSHA inventory to determine the sample. She discussed respirator investigations and how NIOSH is working to increase the value of the investigation outputs for the mining community. She described efforts to assess protective ensembles used by mine rescue workers and discussed results from ensemble evaluations. She introduced a new project under development where NIOSH is identifying suitable materials to improve the chemical performance of escape respirators. Dr. D'Alessandro briefly discussed some respiratory protection products used in other industries that could be applicable to the mining industry. Finally, she asked the following questions to MSHRAC:

What additional strategies should be considered for LTFE report generation?

What additional LTFE dissemination efforts should be conducted to reach miners?

How could the MSHA 1% assessment data be incorporated in the future post market evaluation activities, including NIOSH LTFE project?

What data obtained under the LTFE program is most important to communicate to:

the miners?

the manufacturers?

the mining companies?

Input on potential reviewers for breathing gas chemistry project?

Is there value in exploring ensembles used by fire brigades?

Could assessment of MRE ensembles have applicability in improving miners' work clothing to better protect against dermal and injury hazards?

MR. TOM DUBANIEWICZ, OFFICE OF MINE SAFETY AND HEALTH RESEARCH, NIOSH

Mr. Dubaniewicz provided an overview on emerging issues with lithium ion (Li-ion) battery powered equipment. He provided an overview of Li-ion battery linked thermal events outside of the mining industry, and two events involving intrinsically safe mine equipment. The events suggest potential gaps in intrinsic safety evaluation criteria relative to a Lithium battery safety standard. A Li-ion cell thermal runaway hazard from an internal short circuit was described in terms of cell construction and chemistry. Mr. Dubaniewicz described a novel cell crush testing method that offers certain advantages over a standard flat plate method for inducing internal short circuits. Test results with the new method demonstrated that a certain spiral-wound constructed $LiCoO_2$ cell poses a methane explosion hazard from a cell internal short circuit. A certain $LiFePO_4$ cell was a safer alternative, under specified test conditions. Other potential failure modes should be considered, as appropriate.

MR. ERIC WEISS, OFFICE OF MINE SAFETY AND HEALTH RESEARCH, NIOSH

Mr. Weiss presented information on OMSHR's proposed criteria for an improved rock dust standard. Rock dust is used in underground coal mines to render the fine explosible coal dust inert. Mr. Weiss initially provided information on various rock dust findings from past research including that rock dust must be dispersible in sufficient quantities to effectively inert a propagating coal dust explosion, no amount of rock dust on the floor can compensate for explosible accumulations of fine coal dust on the roof and ribs (walls), and rock dust particles greater than 75 μm (microns) in size are not effective in inerting coal dust explosions. Further discussions summarized the NIOSH's Hazard ID - Non-Conforming Rock Dust issued in October 2011 that recommended that mine operators and rock dust manufactures test their supply of rock dust to assure that it meets the requirements of the rock dust standard 30 CFR 75.2. Mr. Weiss then focused on other rock dust issues not addressed by the Hazard ID including the lack of compliance testing and standard test methods to determine dispersibility and particle size requirements, the fact that no current rock dust meets the non-caking requirement when wetted and dried, and the lack of data to justify permitting up to 5% combustible matter in the rock dust. He then highlighted the 5 factors impacting rock dust effectiveness followed by more detailed discussions on each factor with subsequent proposed improvements to the rock dust standard. Included in his discussion was the recommended use of anti-caking additives that will keep rock dust dispersible even under wet mine conditions. For the anti-caking additives to be allowed, the rock dust must be equally dispersible after being wetted then dried when compared to the dry untreated rock dust, pose no health hazard, and must not contribute to the explosion hazard. Mr. Weiss then discussed the 5 parameters for a new rock dust definition for 30 CFR 75.2 including the use of only limestone and dolomite unless other inert materials passed the recommended standard test methods; particle size requirements where 100% will pass through a 60 mesh sieve (or all rock dust particles must be less than 250 μm), 95% or more will pass through a 200 mesh sieve (particles less than 75 μm), and with a minimum surface area of 7,000 cm2/cm3; when wetted and dried will not cohere to form a cake and will disperse into separate particles by a defined pulse of air (0.3 second air pulse at a 4 psi dynamic pressure - based on full-scale Lake Lynn Experimental Mine coal dust explosion tests); must not contain more than 1% combustible matter; and must not contain more than a total of 4% free and combined silica. Mr. Weiss then provided the key attributes of the new rock dust definition which will first and foremost enhance miner safety by providing better protection against propagating dust explosions, eliminating up to 30% ineffectual rock dust particles that do not contribute to coal dust explosion inerting, providing rock dust that will not cake and remains dispersible, and providing performance criteria and methods that rock dust manufacturers can use to certify their product meets all aspects of the new proposed standard and mine operators and MSHA can use for routine quality control to spot check the compliance of the rock dust supply. The overarching concern is to bring rock dust into compliance with the anti-caking requirements so that it can disperse in sufficient quantity to inert a propagating coal dust explosion. Several of these important issues were addressed by OMSHR researchers in partnerships with MSHA and members of the IMA-NA and NSSGA.

FINDINGS AND RECOMMENDATIONS BY MSHRAC MEMBERS

There was general discussion of the issues among the members following each of the presentations. Specific findings, recommendations, comments, and requests include:

- Additional collaboration with the state mining associations (NV and CO) to include use of electronic media could be beneficial for improved transfer of technology and knowledge to the mining community

-Identifying contacts with UMWA and USW newsletters and consider expanding to include related journals such as chemical engineering news could be beneficial for technology transfer

-Regarding the issues associated with rock dust there were concerns that the composition of foams used for dust control could be a health hazards since a number of miner's have complained of skin rashes and breathing difficulties when they are applied

-There was general discussion on the need for OMSHR to follow-up on the application of dust control technologies to determine if the technologies are actually making a difference in reduced exposures?

-We need to make sure the briefing book and reading materials are sent to the members in advance

-Regarding the safety of lithium batteries there was discussion about the concern of the crush test being too severe and the recommendation that OMSHR should look at the testing protocols for this type of research

-Comments on the deep vein mining project (presented by Whyatt)

Research approach is appropriate and is using lab testing, numerical modeling, in-mine data collection and in-mine observations

Excellent idea to include researchers from South Africa (significant experience base on induced seismicity)

The research could result in applications to many other areas including coal mine bumps

The only negative point raised was "is there a good match to surveillance data?" The number of workers impacted is probably small compared to the overall mining workforce

MSHRAC ACTION ITEMS:

1. The Committee will develop the procedure and metrics for evaluation of the program-centric structure of OMSHR and will present the results at the next MSHRAC meeting.

2. The Committee will address the questions raised by Dr. Alessandro at the next meeting. The questions are:

What additional strategies should be considered for the Long-Term Field Evaluation (LTFE) report generation?

What additional LTFE dissemination efforts should be conducted to reach miners?

How could the MSHA 1% assessment data be incorporated in the future post market evaluation activities, including NIOSH LTFE project?

What data obtained under the LTFE program is most important to communicate to:

the miners?

the manufacturers?

the mining companies?

Input on potential reviewers for breathing gas chemistry project?

Is there value in exploring ensembles used by fire brigades?

Could assessment of MRE ensembles have applicability in improving miners' work clothing to better protect against dermal and injury hazards?

Future potential agenda items (underlined items are requested agenda items for the next meeting).

-Nanoparticles and Diesel Research

-Additional efforts should be given on “getting the word out” including social media, mass mailings and use of MSHA’s “Professional Miner.”

-Foamed rock dust

-Rock dust issues

-Research plan for addressing NAS recommendations on self-escape

-Update on asbestos-like and include research conducted by the University of Minnesota – exposures and fiber characterization

-Updates on O2 supplies

-Update on 1 mg initiative

-Update on refuge alternatives

-Update on DRDS research (every other meeting-next one will be 2015)

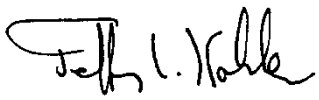
-Need for SCSR’s in metal/nonmetal mines (MSHA presentation) and also chemical hazard approach used by OSHA (also MSHA presentation)

-Update on Lake Lynn Lab replacement

-Continued scoring relative to OMSHR’s performance as a result of the NAS Recommendations

The meeting was adjourned.

I hereby confirm these Summary Minutes are accurate to the best of my knowledge.



Jeffery L. Kohler, PhD, MSHRAC Executive Secretary,

NIOSH Associate Director for Mining; and,

Director, Office of Mine Safety and Health Research

09/30/2013_____

Date